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Alevo USA Inc.
Legislative Stakeholder Presentation
Raleigh, North Carolina
February 17, 2017

Executive Summary

- Duke Energy is proposing **significant, long-lived investments and other costs in the Carolinas** that will result in higher electric bills for all customers

- The proposed investments Duke Energy Progress and Duke Energy Carolinas suggest **leveraging the benefits of energy storage resources may be appropriate**
  - Duck curve caused by large amount of installed solar; curtailment payments
  - Large investment in grid modernization
  - Proposed expansion of pumped storage hydro and significant build out of peaking power plants

- Alevo encourages Duke and other stakeholders to consider ways that technology such as energy storage can **maintain the state's competitive advantage as a low cost place to live and do business** by reducing the amount that needs to be invested in the grid

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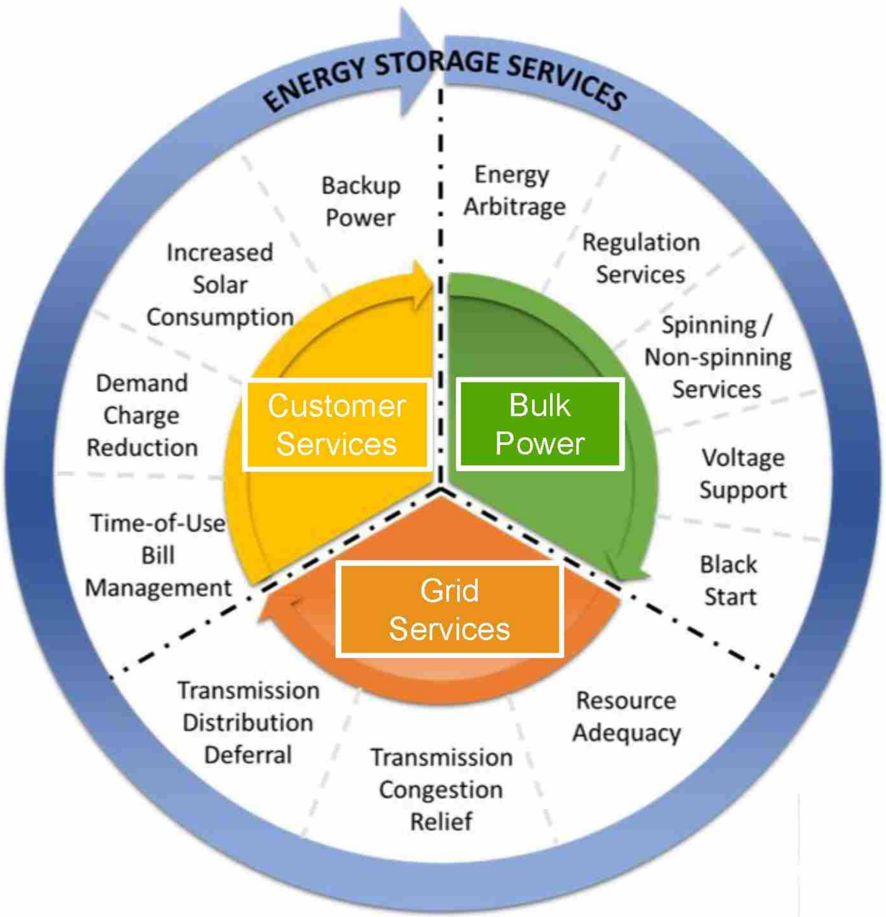
Energy Storage Use Cases

Energy storage resources are cost effective when you can leverage their flexibility to perform multiple grid functions



- Bulk Power
  - Time Shifting Energy
  - Frequency Regulation
  - Voltage Support

Higher Power Plant Efficiency

- Grid Services (T&D)
  - Resource Adequacy
  - Power Quality

Deferred Investment

- Customer Services (Behind the Meter)
  - Peak Shaving
  - Backup Power

Control and Convenience

Massachusetts *State of Charge Report*[1]

- Bay State policymakers Sept. 16 said a 600 MW procurement target by 2025 would lead to $800 million in ratepayer benefits
- The study identified $2 in benefits for every $1 in costs at a full deployment of 1,766 MW (15% of peak)
- A widespread storage deployment is cost effective
  - Lower peak
  - Better generator heat rates and fewer emissions
  - Reduced cost to integrate renewables
  - Increased grid flexibility and resiliency
  - Deferred capital investments

Identified Grid Benefits	Share of Savings
Time shift energy	12%
Reduced Need for Peaking Power Plants	48%
Ancillary services cost reduction	9%
Reduced power plant ramping	9%
Avoided T&D	13%
Improved renewables integration	10%

Notes
1. http://www.mass.gov/eea/docs/doer/state-of-charge-report.pdf

Significant Investment in DEC / DEP Five Year Capital Plan

Source: Duke Investor Presentation 2-16-17

Capital expenditures by utility[1]

DUKE ENERGY.

($ in millions)

Duke Energy Carolinas	2016A	2017E	2018E	2019E	2020E	2021E	2017 - 2021
Electric Generation	$663	$500	$450	$675	$675	$825	$3,125
Electric Transmission	214	75	75	75	50	50	$325
Electric Distribution	392	700	1,250	1,225	1,150	1,225	$5,550
Environmental[2]	374	600	550	225	125	175	$1,675
Duke Energy Carolinas Growth Capital	$ 1,643	$ 1,875	$ 2,325	$ 2,200	$ 2,000	$ 2,275	$ 10,675
Maintenance	861	850	650	675	725	675	3,575
Total Duke Energy Carolinas Capital	**$ 2,504**	**$ 2,725**	**$ 2,975**	**$ 2,875**	**$ 2,725**	**$ 2,950**	**$ 14,250**

Duke Energy Progress	2016A	2017E	2018E	2019E	2020E	2021E	2017 - 2021
Electric Generation	$389	$575	$700	$625	$550	$400	$2,850
Electric Transmission	42	25	75	75	75	100	$350
Electric Distribution	253	350	825	825	775	725	$3,500
Environmental[3]	261	400	375	300	275	325	$1,675
Duke Energy Progress Growth Capital	$ 945	$ 1,350	$ 1,975	$ 1,825	$ 1,675	$ 1,550	$ 8,375
Maintenance	1,002	600	500	600	600	600	2,900
Total Duke Energy Progress Capital	**$ 1,947**	**$ 1,950**	**$ 2,475**	**$ 2,425**	**$ 2,275**	**$ 2,150**	**$ 11,275**

DEC and DEP are proposing **~$19 billion** in incremental investment, which will result in **incremental revenue needs of ~$1.5 billion and ~$1.2 billion**, respectively

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Benefits of an Energy Storage Target

- Energy storage provides significant value to ratepayers and is being deployed cost-effectively where there are enabling regulatory frameworks

- Energy storage technology enables savings because it is a modular solution that can defer lumpy investments
  - Reduced need for peaking power plants by energy storage is more highly utilized
  - Distribution deferrals (e.g. use an energy storage resource instead of a full substation upgrade for a 2-hour per year overload)
  - Lower fuel costs
  - Better renewable integration

- A storage target will enable North Carolina to enable greater public policy goals such as economic development and enhanced grid resiliency

Guiding Principles for Energy Storage Target

- Utility-owned, front-of-meter 2.5% of demand by 2025
  - Leverage multi-use cases to keep electric rates as low as possible
  - Non-recoverable penalties for non-compliance
  - Target is a floor, not a ceiling
- Eligible for cost recovery via the grid modernization rider or REPS statute (CPCN)
- Waiver for utilities if they can prove that use cases are not cost effective

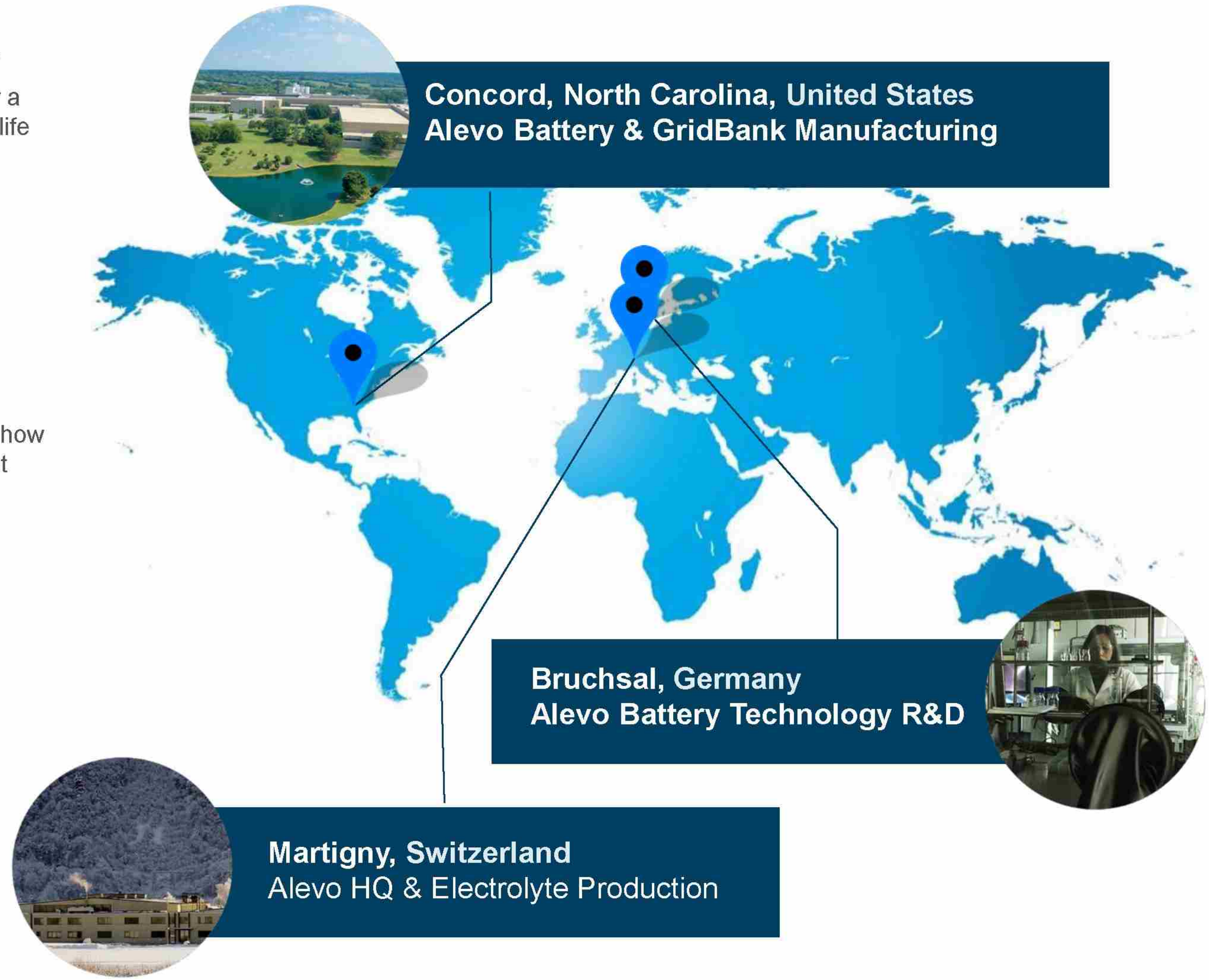
APPENDIX

A multi-national company with its manufacturing hub in Concord, N.C.

Ground Breaking Li-Ion Technology
The first inorganic Lithium-Ion battery, developed over a decade, non-flammable, with up to 10 times the cycle life of conventional Lithium-Ion batteries

Vertically Integrated Manufacturing
Electrolyte manufacturing, battery manufacturing, GridBank™ ESS assembly, systems integration, and project development

Proprietary Grid Analytics
Actionable business intelligence regarding where and how to deploy energy storage solutions to make the biggest impact on the grid



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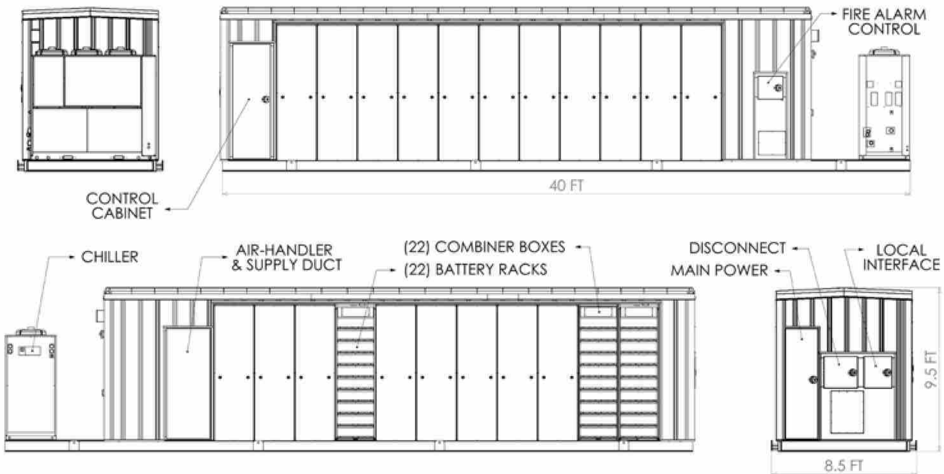
Alevo GridBank Enclosure Configuration



GridBank pictured with Parker Hannifin Inverter


BATTERY CELL


BATTERY MODULE


BATTERY TRAY


22 RACKS IN EACH GRIDBANK

14,080 Cells	**8 cells per module**
1,760 Modules	**4 modules per tray**
440 Trays	**2 trays per shelf**
220 shelves	**10 shelves per rack**
22 racks per GridBank	
Totaling: 2MW / 1 MWh	

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Battery Manufacturing Line

I Electrode Manufacturing

Anode and Cathode Electrode consists of mixing, coating, blanking, and welding.

II Cell & Module Assembly

Sorted and stacked electrodes are brought upstairs to cell and module assembly. This station is made up of 7 major steps.

III Module Fill

During the fill process, each cell in the module is filled with Alevolyte.

IV Formation & Aging

Formation & Aging is a 7 step process that takes 2 weeks to complete.

V Tray Assembly

Four modules are secured and wired to tray and prepared for GridBank assembly.

VI GridBank Assembly

Completed parts are installed into empty GridBanks.

Alevo employs over 200 at its Concord manufacturing plant

Alevo Delivers First GridBank™, Providing Ancillary Services to PJM

First commercial unit will be one of three sites in Hagerstown, MD totaling 12 MW

2 MW / 1 MWh
Snook Substation - Hagerstown, Maryland, USA

- The first GridBank™ storage unit was cleared for shipping and installation after completing an extensive factory acceptance testing (FAT) process at Parker Hannifin's Grid-Tie Division.
- The system was delivered to Hagerstown, Maryland and will be commissioned later in January.
- The unit will be utilized primarily for frequency regulation and charging/discharging cycles in durations of less than an hour.

"We have been testing the GridBank in conjunction with Alevo since August and are satisfied the unit operates as per its design intent. Parker has conducted this process as part of the industry-standard factory acceptance test and initial results confirm the Alevo GridBank capabilities, including high power, long life and safe non-flammable electrolyte. We are excited to see the field performance and proud to have played a key role in this historic milestone"

Jim Hoelscher

General Manager of Parker Hannifin's Energy Grid Tie Division in Charlotte

Benjamin Y. Lowe
Director, Policy and Market Development
Ben.Lowe@Alevo.com
(704) 260-7405 (office)
(704) 792-8797 (mobile)

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